

REMARKS

This Amendment is submitted in response to the Office Action mailed July 19, 2001. The Office Action rejects claims 1-4 and 7-9 under 35 U.S.C. §§ 102(b), 102(e), and 103(a); and claims 1-9 under 35 U.S.C. § 112, second paragraph.

Claims 1-9 are pending in this application. Claims 1 and 3-7 have been amended. Claim 10 has been added.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Versions with Markings to Show Changes Made."

In the Office Action, Claims 1-4 and 7-9 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative under 35 U.S.C. § 103(a) as obvious over European Patent Application EP 762,522 (*Tamaki*). Applicants respectfully submit that this rejection is improper as Applicants believe that *Tamaki* fails to teach or even suggest a number of features of the claimed invention. For example, *Tamaki* fails to teach graphite powders that exhibit high crystallinity and high density of the interstitial planar section of the looped closed structures without having to utilize special, expensive materials to manufacture same. Additionally, for example, *Tamaki* teaches a carbon-lithium intercalation compound where the claimed invention relates to a carbon material that does not intercalate the lithium ion.

Applicants have uniquely discovered that the graphite powders of the present invention exhibit high crystallinity and high density of the interstitial planar section of the looped closed structures without having to utilize special, expensive materials to manufacture same. Further, Applicants have shown that by employing the graphite powders of the present invention as a negative electrode material of a lithium ion secondary battery, it is possible to realize a high discharging capacity that can exceed 350 mAh/g. See, Specification, page 17. This is clearly supported by the experimental tests and results thereof conducted by Applicants beginning on page 43 of the Specification and summarized, for example, in Table 1, on page 48.

In contrast, *Tamaki* fails to teach the surface area and between-closure structure features of the claimed invention as even admitted by the Patent Office. This clearly suggests that *Tamaki* fails to teach or suggest the density feature of the graphite powder of the claimed invention.

In this regard, the Patent Office's reliance on the d spacing teaching of *Tamaki* as suggesting the structural characteristics of the graphite powders of the claimed invention is misplaced. Even if the d spacing is the same as between *Tamaki* and the claimed invention, the Patent Office cannot make the assumption that the other structural features would necessarily be the same as well. Indeed, Table 1 of the Specification illustrates that the c-access (002) planar lattice distance (d002) can remain relatively constant at increasing densities.

Further, the Patent Office admits that *Tamaki* teaches a process in which mesophase pitch is carbonized, milled, contacted with a boron source and heated to graphitization temperatures. This teaching, on its own, clearly fails to teach or suggest the subsequent heat treatment features as further required by Claims 5 and 6.

Indeed, Claim 5 requires that the carbon material is heated to scrape off the surface subsequent to graphitization, and then heated again in an inert environment. Claim 6 depends from Claim 5 and further limits the heating to scrape off the surface to include oxidizing heat. Indeed, Applicants have demonstrated that heat treatments subsequent to graphitization can result in increased densities and therefore increase discharging capacities as illustrated in Table 1 on page 48 of the Specification. Specifically, these subsequent heat treatments allow the interstitial planar pitch to be reduced so that the interstitial planar section density can be significantly increased.

Further, Applicants have amended Claim 1 to show that the carbon material includes a surface of cleavage formed by sheering thereby diminishing the lithium ion capacity loss of the carbon material. The surface of cleavage formed by sheering is not active for the lithium ion. Thus, the surface of cleavage formed by sheering as required by the claimed invention does not intercalate the lithium ion. In contrast, *Tamaki*, specifically teaches a carbon-lithium intercalation compound. *See, Tamaki*, page 2, line 19.

Based on the fact that *Tamaki* fails to teach or suggest each and every feature of the claimed invention, Applicants submit that *Tamaki* fails to anticipate and/or render obvious Claims 1-4 and 7-9. Accordingly, Applicants respectfully request that the prior art rejection of Claims 1-4 and 7-9 in view of *Tamaki* be withdrawn.

In the Office Action, Claims 1-4 and 7-9 stand rejected under 35 U.S.C § 102(e) as anticipated by or, in the alternative under 35 U.S.C. § 103(a) as obvious over United States Patent No. 6,156,457 (*Takami*). Applicants respectfully submit that this rejection is improper as

Applicants believe that *Takami* fails to teach or even suggest a number of features of the claimed invention. For example, *Takami* fails to teach or suggest graphite powders that exhibit high crystallinity and high density of the interstitial planar section of the looped closed structures without having to utilize special, expensive materials to manufacture same. Additionally, for example, *Takami* fails to teach or suggest a surface of cleavage formed by sheering that does not intercalate the lithium ion. Applicants respectfully submit that for the reasons stated above, Claims 1-4 and 7-9 are patentable over *Takami*. Accordingly, Applicants respectfully requests that this rejection be withdrawn.

In the Office Action, Claims 1-9 stand rejected as being indefinite under 35 U.S.C. § 112, second paragraph. Applicants respectfully submit that amended Claims 1 and 3-7 adequately address and overcome the Examiner's arguments regarding indefiniteness. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Applicants note for the record that the changes made to the claims to address the rejections under §112, second paragraph are made for clarification purposes and therefore were not intended to narrow the scope of the claimed subject matter.

Accordingly, Applicants respectfully submit that the rejections raised by the Examiner with respect to the present application have been overcome and, thus, be withdrawn.

Thus, for the foregoing reasons, Applicants respectfully request reconsideration of the present application and earnestly solicit an early allowance of same.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claim 10 has been added.

Claim 1 has been amended as follows:

1. (Thrice Amended) A graphite powder comprising a carbon material containing 0.01 to 5.0 wt% of boron and having a looped closure structure at an end of a graphite c-planar layer on ~~the~~ at least a surface of cleavage formed by sheering a powder, with ; wherein the density of the interstitial planar sections between neighboring closure structures ~~being~~ is not less than 100/ μm and not more than 1500/ μm ; and wherein said carbon material is surface processed ~~under a condition of by scraping off the surface of the graphite c-planar layer. produced graphite powder.~~

Claim 3 has been amended as follows:

3. (Amended) The graphite powder according to claim 1 ~~or 2~~ wherein the specific surface area is not more than 1.0 m^2/g , and at least one of the crystalline diameter is 100 to 2000 Å and ~~or~~ the volume cumulative mean particle size as measured by the laser diffraction scattering method is 5 to 35 μm .

Claim 4 has been amended as follows:

4. (Amended Four Times) A method for producing a graphite powder containing an amount of boron according to claim 1, the method comprising the steps of:

pulverizing a carbon material ~~at an elevated speed~~ at least one of before and ~~or~~ after carbonization; and

heat-treating the carbon material at a temperature ~~exceeding~~ not less than 1500°C thereby causing graphitization to occur, for graphization wherein a boron compound is added to the carbon material prior to graphitization. graphization.

Claim 5 has been amended as follows:

5. (Amended Four Times) A method for producing a graphite powder containing an amount of boron according to claim 1, the method comprising the steps of:

pulverizing a carbon material at least one of before and ~~or~~ after carbonization;

heat-treating the carbon material at a temperature ~~exceeding~~ not less than 1500°C thereby causing graphitization to occur, for graphization wherein a boron compound is added to the carbon material prior to graphitization; graphization;

causing scraping of the surface of the graphite powder to occur by heating the carbon material under a condition of scraping off the surface of the produced graphite powder; and
heating the carbon material in an inert gas at a temperature ~~exceeding~~ not less than 800°C.

Claim 6 has been amended as follows:

6. (Twice Amended) The method for producing a graphite powder according to claim 5 wherein ~~heating under the condition of the step of causing scraping of the surface of the graphite powder to occur by heating the carbon material off the surface of the produced graphite powder~~ includes oxidizing heat treatment.

Claim 7 has been amended as follows:

7. (Twice Amended) The method for producing a graphite powder according to claim 4 wherein the carbon material is obtained by at least one of a carbonization of mesophase globules and/or the bulk mesophase.